

## CLAIMS

*What is claimed is:*

- 1           1. A low noise amplifier redundancy system comprising:
  - 2           an antenna receiving a received signal;
  - 3           at least two low noise amplifiers (LNAs), each low noise amplifier comprising
  - 4           a low noise amplifier input that receives the received signal and a low noise amplifier
  - 5           output;
  - 6           an switch having an input connected to the received signal, and at least two
  - 7           outputs, each output connected to a separate low noise amplifier input;
  - 8           a controller that controls the switch and the low noise amplifiers to select one
  - 9           of the low noise amplifiers, such that the received signal is amplified by only one of
  - 10          the low noise amplifiers; and
  - 11          a combiner connecting the outputs of the low noise amplifiers to a single
  - 12          signal line.
- 1           2. A redundant receiving system comprising:
  - 2           a plurality of receiving chains, each comprising
  - 3           a received signal;
  - 4           a splitter having two outputs with each outputting the same received
  - 5           input signal;
  - 6           a down converter connected to one output of the splitter; and
  - 7           an upstream receiver connected to the down converter;
  - 8           a redundancy switch having a plurality of inputs, each input connected to a
  - 9           splitter output from each receiving chain;
  - 10          a back-up down converter connected to an output of the redundancy switch;
  - 11          a back-up upstream receiver connected to the back-up down converter; and

12 a first controller connected to the redundancy switch to select one of the  
13 outputs from the plurality of splitters.

1 3. The system of Claim 2, wherein each receiving chain further comprises:

2 an amplifier switch having an input connected to the received signal, and two  
3 outputs;

4 two low noise amplifiers (LNAs), each low noise amplifier having an input  
5 connected to one output of the amplifier switch;

6 a second controller connected to control the amplifier switch and the low noise  
7 amplifiers, such that the received signal is amplified by only one of the low noise  
8 amplifiers; and

9 a combiner connecting the outputs of the low noise amplifiers to the splitter.

1 4. The system of Claim 3, wherein each receiving chain further comprises a  
2 band-pass filter connected between the antenna and the switch.

1 5. A method for providing redundancy in a wireless hub, comprising:

2 receiving a plurality of upstream signals;

3 amplifying each upstream signal with a separate low noise amplifier;

4 down converting the output of each of the low noise amplifier by utilizing a  
5 separate down converter;

6 receiving a down converted signal from each down converter with a separate  
7 receiver;

8 providing a data signal from a receiver; and

9 when no data signal is provided by one of the receivers, selecting an alternate  
10 low noise amplifier to amplify the associated upstream signal.

1 6. The method of Claim 5, further comprising when no data signal is provided  
2 by one of the receivers after selecting an alternate low noise amplifier, providing the

3 output of the low noise amplifier associated with the receiver to a redundant down  
4 converter, the redundant down converter providing a redundant down converted signal  
5 to a redundant receiver.

1 7. A method for providing redundancy in a wireless hub, comprising:  
2 receiving a plurality of upstream signals;  
3 amplifying each upstream signal with a separate low noise amplifier;  
4 down converting the output of each of the low noise amplifier by utilizing a  
5 separate down converter;  
6 receiving a down converted signal from each down converter with a separate  
7 receiver;  
8 providing a data signal from a receiver; and  
9 when no data signal is provided by one of the receivers, providing the output  
10 of the low noise amplifier associated with the receiver to a redundant down converter,  
11 the redundant down converter providing a redundant down converted signal to a  
12 redundant receiver.

1 8. A low penetration receiving system comprising:  
2 a plurality of low noise amplifiers;  
3 a switch having a plurality of inputs, each input connected to one low noise  
4 amplifier;  
5 a down converter connected to an output of the switch; and  
6 an upstream receiver connected to the down converter;  
7 wherein the down converter and receiver are time shared between signals  
8 produced by each low noise amplifier.

1 9. A low penetration receiving system with redundancy comprising:

a plurality of low noise amplifiers, each amplifier amplifying an upstream signal;

a plurality of splitters, each splitter connected to an amplifier and having a first output and a second output;

a first switch having a plurality of inputs, each input connected to a distinct one of the first outputs of the plurality of splitters;

a second switch having a plurality of inputs, each input connected to a distinct one of the second outputs of the plurality of splitters;

a first down converter connected to an output of the first switch;

a first upstream receiver connected to the first down converter;

a second down converter connected to an output of the second switch;

and

a second receiver connected to the second downconverter.

10. The system of Claim 9, further comprising a plurality of secondary low noise amplifiers, wherein one secondary low noise amplifier is connected in parallel to one of the plurality of low noise amplifiers.

11. A method for low penetration redundancy, the method comprising:

receiving a plurality of upstream signals;

amplifying each upstream signal with a separate low noise amplifier;

splitting each amplified signal into two signals;

down converting the output of each of the low noise amplifier with a single down converter;

receiving a down converted signal from the down converter with a single receiver;

time sharing the down converter and receiver during a low penetration period;

10 providing a data signal from the receiver; and  
11 when no data signal is provided by the receiver when receiving a signal from  
12 one of the low noise amplifiers, providing the output of the low noise amplifier to a  
13 redundant down converter, the redundant down converter providing a redundant down  
14 converted signal to a redundant receiver.